

of great difficulty, became in later years the ruling interest of his life, and to them he devoted the whole of his time and thoughts. If, in the opinion of some botanists, he unduly multiplied generic and specific definitions, and if his generalizations have not in all cases met with universal acceptance, none can deny the importance of the facts he adduced, or the minuteness and laborious accuracy of his original investigations. He was, to the last, an opponent of the theory of evolution.

In June 1879 he was compelled by failing health to desist from active work. From this period he became more infirm, and after a gradual decay, borne with never failing patience, expired on the 17th October, 1879, in the ninety-first year of his age. In private life he was esteemed by all who knew him.

The whole of his extensive herbarium has been bequeathed by him to the British Museum.

Nicholson's 'Manual of Palæontology.'

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,—I am very sorry to find that my esteemed friend Prof. H. Alleyne Nicholson has, in the new edition of his 'Manual of Palæontology' (vol. ii. p. 138, footnote), committed the mistake of quoting my authority for elevating the Platysomid fishes to the "rank of a distinct division of Ganoids." No such proposition occurs in my unpublished paper to which he refers, which was written to follow up the views which I expressed in my account of the structure of the Palæoniscidæ (Palæontogr. Soc. 1877) as to the abolition of the suborder "Lepidopleuridæ," necessitated by the demonstration of the fact that the Platysomidæ are not really allied to the Pycnodontidæ, but are, on the other hand, so closely linked to the Palæoniscidæ by ties of structure, that wherever we place the one family, thither the other must follow.

My paper on the "Structure and Affinities of the Platysomidæ" was read before the Royal Society of Edinburgh on May 5 of this year, and will, in a few weeks, appear in the forthcoming fasciculus of that Society's 'Transactions.' Prof. Nicholson's mistake as to my views is obviously due to his having had only a very hurried glance over my proof-sheets, and that only on a single occasion.

I am, &c.,

Edinburgh, Nov. 12, 1879.

R. H. TRAQUAIR.

On the Organization and Classification of the Orthonectida.

By M. A. GIARD.

In a former communication* I indicated the existence of a new class of animals which present permanently the usually transitory form called *planula* by embryogenists. New investigations enable me now to complete the history of these animals and to settle the place which they should occupy in the subkingdom

* 'Comptes Rendus,' October 29, 1877, p. 812; translated in Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 181.

Vermes. My researches have been made upon *Intoshia linei*, parasitic upon a Nemertean, and upon two species parasitic upon Ophiurans, *Rhopalura ophiocomæ* and *Intoshia gigas*.

The movements, independent of vibratile cilia, which I observed in these parasites are due to the presence of musculoid bands belonging to the endodermic cells, and forming a splanchno-pleural pseudo-mesoderm, analogous to the somato-pleural pseudo-mesoderm formed in the Cœlenterata by the epithelio-muscular cells of Kleinenberg and Korotneff.

To the *ensemble* of these elements I give the name of *pseudo-mesoderm*, because I think it right to reserve the name of *mesoderm*, properly so called, for other formations, which do not exist in the Orthonectida, and the homology of which in the various groups of Metazoa is rather difficult to establish. I distinguish :—

1. A *solid mesoderm*, formed very early at the expense of the endodermic cells of the embryo (rudiment of the chorda of the Tunicata and Vertebrata; skeletogenic cells of the embryo of Echinoderms; mesodermic cells issuing from the four first spheres of the endoderm of the *Planarice* and of *Bonellia*, according to the researches of P. Hallez, Sprengel, &c.).

2. A *cavitory mesoderm*, formed by diverticula of the endoderm (enterocœles) and appearing generally at a later period (aquiferous system of the Echinoderms, enterocœle of the Tunicata, Brachiopoda, *Sagitta*, *Amphioxus*, &c.).

The solid mesoderm gives origin especially to the muscular system; the cavitory mesoderm principally forms the vascular organs.

The physiological function of a histological element, however, is only of secondary importance in the determination of phylogenetic homologies. A muscular element, for example, will always originate where the want of it is felt, whether in a rudiment of endodermic origin, or at the expense of ectodermic elements (Nemerteans). It may even be formed from only a portion of a cell (plastidule), as occurs in the Infusoria, the Cœlenterata, and the Orthonectida.

The reproduction of the Orthonectida is effected in two different manners :—

1. Sexually. In different cases, there is formation of a *blastula* which becomes laminated (*Intoshia gigas*), or production of an epibolic *gastrula* which finally closes (*Rhopalura ophiocomæ*). In either case the result is a permanent ciliated *planula* with a metamerized ectoderm. The ectodermal metameres contain each a single series of cells in *Rhopalura* and several series in *Intoshia*.

2. By gemmiparity in the interior of enormous sporocysts, formed by the endoderm of the progenitive animal. It is in consequence of this gemmiparous reproduction that the Orthonectida are met with in such great abundance in an infested animal.

This double mode of reproduction approximates the Orthonectida to the Dicyemida and other parasitic worms (Trematoda and Cestoda). Their more simple organization during the embryonic period

leads us to place them below the Dicyemida. The subkingdom Vermes will therefore include the following classes:—

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| 1. Orthonectida. | 3. Trematoda. |
| 2. Dicyemida. | 4. Cestoda. |
| 5. Turbellaria (Planarians and Nemerteans). | |

Of the animals formerly classed with the preceding, some (Bryozoa, Annelida, and associated groups) are intimately allied to the true Mollusca, with which I unite them to form the subkingdom *Gymnotoca*; the others constitute a whole which may be called *Nematelmia*, including the Nematoida, Echinorhyncha, Desmoscolecida, Gastrotricha, &c. The Tunicata must be placed at the foot of the subkingdom Vertebrata.

The Orthonectida are Gastræada brought by parasitism to the state of *planula*. Their importance from the point of view of the *Gastræa*-theory is much greater than that of the *Physemaria*. These latter, in fact, only lead to the Cœlenterate branch, which terminates in a *cul-de-sac*; while the Orthonectida represent a stem of the Vermes, and consequently belong to the main trunk of the genealogical tree of the Metazoa.—*Comptes Rendus*, September 22, 1879, p. 545.

Remarks on *Orgyia*.

Prof. Leidy remarked that *Orgyia leucostigma*, which now seriously infests the shade trees of Philadelphia, especially the horse-chestnuts and silver maples, had recently passed into the moth stage. The trunks of the trees and the surrounding railing of the square opposite to the Academy exhibit a profusion of cocoons. In seeking for specimens of the male moth, he had collected only three, in a walk along one side of the square, from the railing, where hundreds of the wingless females were to be obtained as they rested with their foamy white masses of eggs on their cocoons. From the fewness of the males he was led to suspect that the females might perhaps, in many instances, deposit the eggs in an unfecundated condition. To ascertain if this were so, he collected several dozen cocoons with pupæ of females, distinguished by their comparatively robust character, and placed them in a covered box in his study in the third story of a back building, separated from the nearest place where there were other cocoons by the front building and the width of the street in front of his house. As the females came out of the cocoons, distended with eggs, these, with the exception of a few which appeared to be accidentally dropped, in several individuals were retained. After some days, as none of the females laid their eggs, the box was uncovered; and on the second morning subsequently several individuals had deposited masses of eggs, though no males were present in the box. However, on examining the vicinity, four male moths were detected on the outside of the curtain of the window in which the box had been placed, from which it was supposed that the females had been visited by males attracted during the night from the neighbourhood.